HRS DOCUMENTATION RECORD

Name of Site: Hidden Lane Landfill [1]

EPA ID No.: VAD980829030

Contact Persons

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Pathways, Components, or Threats Not Scored

No releases are documented to the surface water, soil exposure and air migration pathways. These pathways were not scored because they would not contribute significantly to the overall site score.

[1] Hidden Lane Landfill was formerly referred to as Loudoun Dump.

HRS DOCUMENTATION RECORD

Name of Site:	Hidden Lane Landfill
EPA Region:	3
Date Prepared:	September 2007; revised March 2008 (Pages 1, 7, 14-17; 18-23, and 29-30 were revised March 2008; page 17a was added March 2008.)
Street Address of Site*:	Off of Persimmon Lane, approximately ¾ mile north of Route 7
City, County, State:	Sterling, Loudoun County, Virginia, 20165
General Location in the State:	Northeast
Topographic Map:	Sterling, Virginia-Maryland
Latitude:	39° 3' 22.07" north
Longitude	77° 25' 27.03" west

The Hidden Lane Landfill is located off of Persimmon Lane, approximately ¾ mile north of Route 7 in Sterling, Loudoun County, Virginia (Ref. 3, p. 3). The geographic coordinates for the approximate center of the dump are 39° 6' 54" north latitude and 76° 33' 47.988" west longitude. There are no structures or other fixed points currently located on the property; therefore, the coordinates of the Hidden Lane Landfill were calculated from the approximate center of the dump, as shown by the "X" designated on the topographic map included as Reference 5. The coordinates were measured using map interpolation on the U.S. Geological Survey (USGS) 7.5-minute topographic map of the Sterling, Virginia quadrangle, using ArcGIS 9 software. UTM coordinates were converted to latitude and longitude NAD83 using CorpsCon software of the U.S. Army Corps of Engineers Topographic Engineering Center (Refs. 4 and 5).

The dump is bordered to the north by an undeveloped portion of the property and the Potomac River, to the east by the residential development called Countryside, to the south by Persimmon Lane and a residential development that is known as Broad Run Farms, and to the west by residential development that is also part of Broad Run Farms (Ref. 3, p. 4).

**The street address, coordinates, and contaminant locations presented in this Hazard Ranking System (HRS) documentation record identify the general site location. The information represents one or more locations the U.S. Environmental Protection Agency (EPA) considers part of the site based on screening information EPA used to evaluate the site for National Priorities List (NPL) listing. EPA assigns national priorities from the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, and not on precisely delineated boundaries. A site is defined as an area where a hazardous substance has been "deposited, stored, placed, or otherwise have come to be located." Generally, HRS scoring and the subsequent listing of a release represent the initial determination that a certain area may need to be addressed under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of site boundaries at the time of HRS scoring will be defined as more information is developed on the locations of contamination.*

Scores

Ground Water Migration Pathway	100
Surface Water Migration Pathway	NS
Soil Exposure Pathway	NS
Air Migration Pathway	NS
HRS SITE SCORE	50.00

Notes:
NS = not scored

WORKSHEET FOR COMPUTING HRS SITE SCORE

	S pathway	S^2 pathway
Ground Water Migration Pathway Score (S_{gw})	100	10,000
Surface Water Migration Pathway Score (S_{sw})	NS	NS
Soil Exposure Pathway Score (S_s)	NS	NS
Air Migration Score (S_a)	NS	NS
$S^2_{gw} + S^2_{sw} + S^2_s + S^2_a$		10,000
$(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4$		2,500
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4}$		50.00

Note:
NS = not scored

Table 3-1 --Ground Water Migration Pathway Scoresheet

Factor categories and factors	Maximum Value	Value Assigned	
Aquifer Evaluated:			
Likelihood of Release to an Aquifer:			
1. Observed Release	550	550	
2. Potential to Release:			
2a. Containment			
2b. Net Precipitation			
2c. Depth to Aquifer			
2d. Travel Time			
2e. Potential to Release [lines 2a(2b + 2c + 2d)]			
3. Likelihood of Release (higher of lines 1 and 2e)	550		550
Waste Characteristics:			
4. Toxicity/Mobility	(a)	10,000	
5. Hazardous Waste Quantity	(a)	10,000	
6. Waste Characteristics	1,000		100
Targets:			
7. Nearest Well	(b)	50	
8. Population:			
8a. Level I Concentrations	(b)	457.4	
8b. Level II Concentrations	(b)	0	
8c. Potential Contamination	(b)	61.3	
8d. Population (lines 8a + 8b + 8c)	(b)	518.7	
9. Resources	5	0	
10. Wellhead Protection Area	20	0	
11. Targets (lines 7 + 8d + 9 + 10)	(b)		568.7
Ground Water Migration Score for an Aquifer:			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100		100
Ground Water Migration Pathway Score:			
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100		100

[a] Maximum value applies to waste characteristics category
[b] Maximum value not applicable
[c] Do not round to nearest integer

REFERENCES

1. U.S. Environmental Protection Agency (EPA). Hazardous Ranking System (HRS): Final Rule. Title 40 of the *Code of Federal Register* (CFR), Part 300, Federal Register, Volume 55, No. 241. December 14, 1990. Excerpt, 1 page (Note that a full copy of the HRS Final Rule is available at the Region 3 Docket upon request).

2. EPA. Superfund Chemical Data Matrix. January 2004. 17 pages.

3. Tetra Tech EM Inc. (Tetra Tech). "Trip Report for the Loudoun Dump Site Integrated Assessment." March 31, 2006. 61 pages.

4. U.S. Army Corps of Engineers, Engineer Research and Development Center, Topographic Engineering Center. Corpscon, Version 6.X. "Technical Documentation and Operating Instructions". August 2004. 3 pages.

5. U.S. Geological Survey (USGS). 7.5 Minute Series Topographic Map. Sterling, Virginia-Maryland 1999. 1 map.

6. NUS Corporation. "Site Inspection of Loudoun Dump Site." January 13, 1989. 91 pages.

7. Virginia Department of Health. "Preliminary Assessment of Loudoun Dump Site Virginia Site 257." September 30, 1985. 20 pages.

8. Loudoun County, Virginia. "Broad Run Farms Water Contamination Issue Water Testing Results". On-Line Address: http://www.co.loudoun.va.us/issues/tce.htm. 4 pages. Website accessed on April 26, 2007.

9. EPA. "National Primary Drinking Water Standards Maximum Contaminant Levels." On-Line Address: http://www.epa.gov/safewater/mcl.html. 6 pages. June 2003. Excerpt.

10. Tetra Tech. Record of Telephone Conversation Regarding Loudoun County Dump Between Donna Davies, Environmental Scientist and Terrence Wharton, Director Loudoun County Department of Building & Development. April 30, 2007. 1 page.

REFERENCES (Continued)

11. EPA. Region III Environmental Science Center, Fort Meade, Maryland. Organic Data Validation Report for the Loudoun County Dump Site. January 10, 2006. 66 pages.

12. Lee, K.Y. U.S. Geological Survey Professional Paper 1472. "Triassic-Jurassic Stratigraphy of the Culpeper and Barboursville Basins, Virginia and Maryland". 1989. 52 pages.

13. Lee, K.Y. U.S. Geological Survey Open-File Report 79-1557. "Triassic-Jurassic Geology of the Northern Part of the Culpeper Basin, Virginia and Maryland". 1979. 17 pages.

14. USGS. "Geologic Map of Loudoun County, Virginia" pamphlet to accompany Geologic Investigations Series Map I-2553. 2006. 1 34 page pamphlet and 1 map.

15. USGS. "Ground-Water Resources of the Culpeper Basin, Virginia and Maryland. Map I-1313-F. 1985. 2 sheets.

16. USGS. "Map Showing Planar and Linear Features in the Culpeper Basin and Vicinity, Virginia and Maryland. Map I-1313-G. 1984. 1 sheet.

17. Tetra Tech. "Project Note to Accompany Residential Well Logs and Well Location Figure. May 7, 2007. 72 pages. Confidential.

18. Tetra Tech. "Trip Report for Residential Well Sampling". April 24, 2007. 14 pages.

19. EPA. Region III Environmental Science Center, Fort Meade, Maryland. Organic Data Validation Report for the Loudoun Dump Site. November 4, 2005. 14 pages.

20. EPA. Region III Environmental Science Center, Fort Meade, Maryland. Organic Data Validation Report for the Loudoun Dump Site. November 7, 2005. 27 pages.

21. State Water Control Board, Richmond Virginia. Memorandum Regarding Loudoun County – Rubble Landfill PC # 73-513. From John Hopkins, Pollution Control Specialist. To HATS Chief. November 14, 1973. 1 page.

22. Loudoun County Health Department. Memorandum. From CFCox, Sanitarian Supervisor. To File. Regarding Smith Moran Hidden Lane Landfill Inspection October 24, 1973. November 15, 1973. 2 pages.

REFERENCES (Continued)

23. Loudoun County Health Department. Memorandum To File. From CFCox, Sanitarian Supervisor. Regarding Smith Moran Hidden Lane Landfill Inspection November 8, 1973. November 15, 1973. 2 pages.

24. Loudoun County Health Department. Memorandum To File. From William D. Vermilye, Registered Sanitarian. Regarding Hidden Lane Landfill Inspection January 21, 1977. January 24, 1977. 1 page.

25. Loudoun County Health Department. Memorandum For Record. From R Montgomery, Sanitarian Supervisor. Regarding Hidden Lane Landfill Inspection April 24, 1977. 2 pages.

26. Loudoun County Health Department. Memorandum For Record. Regarding Hidden Lane Landfill Inspections December 13 and 21, 1977. 1 page.

27. County of Loudoun, Department of Public Health. Letter From Robert Montgomery, Supervisor, Environmental Health. To Bob Wiser, Hidden Lane Landfill. Regarding Disposal of 55 Gallon Drums Containing Toxic Chemical Residues. May 21, 1981. 1 page.

28. Commonwealth of Virginia. Department of Health. Letter From Hans J. Mueller, P. E., Director Bureau of Solid Waste Management. To Elmer T. Wiser. Regarding Permit #356, Hidden Lane Debris Landfill Loudoun County. 2 pages.

29. County of Loudoun, Department of Public Health. Memorandum To File. From Robert F. Montgomery, Supervisor. Regarding Smith-Moran Landfill. April 5, 1983. 2 pages.

30. RESERVED

31. National Testing Laboratories. Analytical results from residential well sample collected at 21240 Redrose Drive. April 25, 1995 and July 31, 1997. 5 pages.

32. HDR Engineering, Inc. Letter To Joan Jennings, Esquire, Assistant County Attorney, Office of the County Attorney, County of Loudoun. From Jerome J. Leszkiewicz, P.E., Program Manager. Regarding Hidden Lane Landfill, Review of Materials Presented to the Virginia Deaprment of Waste Management by SCS Engineers and Dames & Moore on March 20, 1989. May 3, 1989. 10 pages.

REFERENCES (Continued)

33. CH2MHill. Letter To Terrance D. Wharton, Director of Engineering, County of Loudoun. From David K. Conrad, Project Manager. Regarding Landfill Gas Monitoring Well Installations and Subsequent Monitoring. September 23, 1988. 6 pages.

34. State Department of Health, Richmond, Virginia. Inter-Office Correspondence. To W.F. Gilley, Director. From Robert H. Forman, Consultant, Division of Solid & Hazardous Waste Management. Regarding Demolition – Rubble Landfills. February 7, 1980. 2 pages.

35. County of Loudoun, Office of County Attorney. Letter To Robert Wickline, Director of Solid Waste, Department of Health, Division of Solid and Hazardous Waste Management. From Edward J. Finegan, County Attorney. Regarding Hidden Lane Debris Landfill, Loudoun County, Virginia, State Permit 356. File #107/59/11-001. February 1, 1985. 2 pages.

36. EPA. Region III Environmental Science Center, Fort Meade, Maryland. Organic Data Validation Report for the Loudoun Dump Site. February 23, 2007. 37 pages.

37. InfoMap Technologies Incorporated. Environmental FirstSearch Report. Target Property 45460 Persimmon Lane, Sterling, Virginia. November 20, 2006. 87 pages.

38. Tetra Tech. Record of Telephone Conversation Regarding Spill Records Files Between Donna Davies, Environmental Scientist and Alexander Wardle, Environmental Geologist, Virginia Department of Environmental Quality. April 27, 2007. 1 page.

39. Broad Run Farms Civic Association. "Report of the Broad Run Farms Civic Association Ad Hoc Committee on the Refuse Disposal in the County of Loudoun, Virginia". February 23, 1973. 12 pages.

40. Tetra Tech. Record of Telephone Conversation Regarding Water Supply Between Matt Kandefer, Environmental Scientist and Ralph Welliver, Loudoun County Sanitation Authority. March 24, 2006. 1 page.

41. Tetra Tech. E-Mail Correspondence Regarding Fairfax, Virginia Water Supply From Dave Binning, Director of Engineering To Matthew Kandefer, Environmental Scientist. April 10, 2006. 2 pages.

REFERENCES (Continued)

42. EPA. Safe Drinking Water Information System. Accessed on April 10, 2006. On-Line Address: http://oaspub.epa.gov/enviro/sdw_query.get_list. 9 pages.

43. City of Fairfax. "2004 Water Quality Report". 8 pages. 2004.

44. City of Fairfax. Fairfax Water. Obtained from Fairfax Water Website – Home – About Us." Information Accessed on April 10, 2006. On-Line Address: http://www.fcwa.org/about_us.htm. 1 page.

45. Metropolitan Washington Council of Governments. Metropolitan Washington Region Water Supply Agencies. Accessed on April 10, 2006. On Line Address: http://www.mwcog.org/environment/water/watersupply/suppliers.asp. 13 pages.

46. Washington Suburban Sanitary Commission. "Water Quality Report – 2004". 2 pages. 2004.

47. U.S. Census Bureau. State & County QuickFacts for Loudoun County, Virginia. Last updated January 12, 2006. 2 pages. On-Line Address: http://quickfacts.census.gov.

48. U.S. Census Bureau. State & County QuickFacts for Montomery County, Maryland. Last updated January 12, 2006. 2 pages. On-Line Address: http://quickfacts.census.gov.

49. Tetra Tech. 4-Mile Target Distance Category Figure. April 25, 2007. 1 sheet.

50. Tetra Tech. Project Note Prepared By Donna Davies, Environmental Scientist Regarding Determination of Private Drinking Water Wells Located Within 4-Mile Distance Categories of Loudoun County Dump Site. May 7, 2007. 10 pages.

51. EPA. Ground Water Issue. TCE Removal from Contaminated Soil and Ground Water. January 1992. 10 pages.

52. Tetra Tech. Record of Telephone Conversation Regarding Hidden Lane Landfill Files Between Donna Davies, Environmental Scientist and Monica Gorman, Compliance Specialist, Loudoun County Office of Solid Waste Management. May 2, 2007. 1 page.

53. NUS Corporation. Loudoun Dumpsite. Logbook No. 730. TDD No. 8801-22. February 16 and 17, 1988. 9 pages.

REFERENCES (Continued)

54. NUS Corporation. Chain of Custody Record 3-6888. February 17,1988. 1 page

55. Tetra Tech. Project Note Prepared by Donna Davies, Environmental Scientist Regarding Population Served by Level I and Level II Wells. July 16, 2007. 2 pages.

56. Tetra Tech. Potable Wells Sample Form, Loudoun Dumpsite, Sterling, Loudoun County, Virginia. October 3 through October 6, 2005. 14 pages. Confidential.

57. Tetra Tech. Loudoun County Logbook. January 22 and 23, 2007. 3 pages. Confidential.

58. Envirosystems, Inc. Laboratory Analytical Data Form I. EPA Contract Laboratory Program Case No. 34667. Samples Received October 5 through 7, 2005. 61 pages.

59. A4 Scientific. Laboratory Analytical Data Form I. Contract Laboratory Program Case No. 34708. Samples Received October 5 through 8, 2005. 57 pages.

Source: Modified from USGS Color Infrared Digital Orthophoto Quarter-Quadrangles for Sterling, Virginia-Maryland Quadrangle, 1999

0 0.25 0.5 Miles

Quadrangle Location =

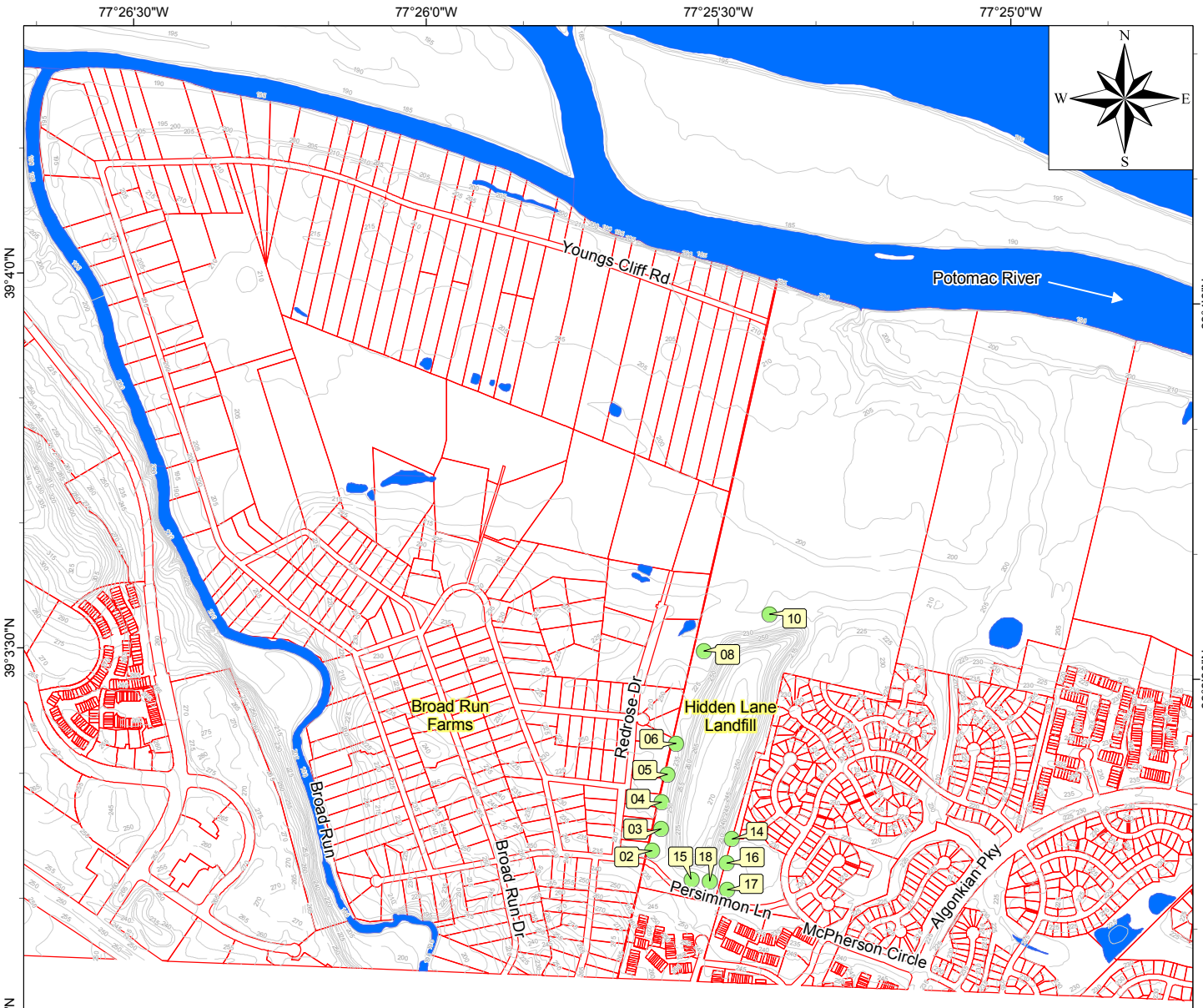
Hidden Lane Landfill
Sterling, Loudoun County, Virginia

Figure 1
Source Location Map

TDD No. E23-018-07-07-002
EPA Contract No. EP-S3-05-02

Map created on July 16, 2007
by D. Call, Tetra Tech EM Inc.

TETRA TECH



Legend

- Soil sampling location
- Elevation contour
- Tax parcel boundary

Notes:
Contour interval is 5 feet.
For the sake of clarity, the SS and BS prefixes used in the HRS documentation record have been omitted. The SS designation indicates the soil sample was collected from this location at a depth of 0 to 2 feet. The BS designation indicates the soil sample was collected below 2 feet.

Source: Modified from USGS Color Infrared Digital Orthophoto Quarter-Quadrangles for Sterling, Virginia-Maryland Quadrangle, 1999 and from Loudoun County, Virginia Office of Mapping and Geographic Information, 2001

0 500 1,000 Feet

Quadrangle Location =

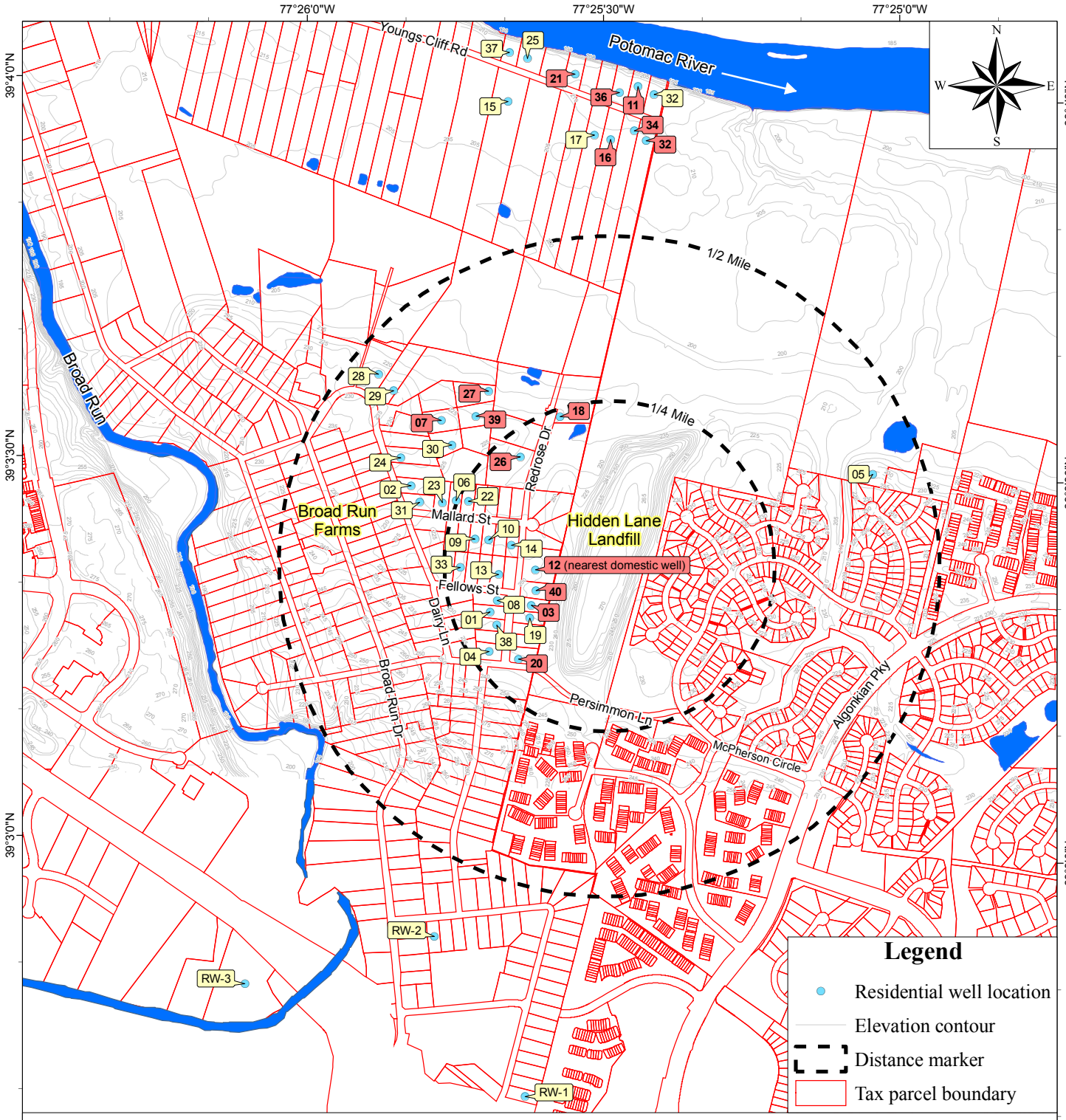
Hidden Lane Landfill
Sterling, Loudoun County, Virginia

Figure 2
Source Sampling Location Map

TDD No. E23-018-07-07-002
EPA Contract No. EP-S3-05-02

Map created on July 16, 2007
by D. Call, Tetra Tech EM Inc.

TETRA TECH



Notes: Contour interval is 5 feet. Labels in bold face with red backgrounds indicate TCE levels exceeding the contract required quantitation limit.
For the sake of clarity, the sample identifiers used in the HRS documentation record (ex. 003-PW-03) have been shortened to reflect the last two digits only (ex. 03).

Source: Modified from USGS Color Infrared Digital Orthophoto Quarter-Quadrangles for Sterling, Virginia-Maryland Quadrangle, 1999 and from Loudoun County, Virginia Office of Mapping and Geographic Information, 2001

0 500 1,000 Feet

Quadrangle Location =

Hidden Lane Landfill
Sterling, Loudoun County, Virginia

Figure 3
Residential Well Sampling Location Map

TDD No. E23-018-07-07-002
EPA Contract No. EP-S3-05-02

Map created on July 16, 2007
by D. Call, Tetra Tech EM Inc.

TETRA TECH

SITE SUMMARY

The Hidden Lane Landfill is located north of Persimmon Lane, approximately ¾ mile north of Route 7 in Sterling, Loudoun County, Virginia (Ref. 3, p. 3). The area to the north of the former dump is undeveloped land, which extends about 2,000 feet to the Potomac River. This area to the north is bisected by a sewer line, which runs east to west parallel to the Potomac River. A residential community called Countryside is located directly to the east of the dump. The Broad Run Farms community to the west and south of the dump consists of residential properties with private drinking water wells. Figure 2 in Reference 3 illustrates the layout of the dump (Ref. 3, pp. 2 and 3).

The Hidden Lane Landfill was operated as the Hidden Lane Landfill. The Hidden Lane Landfill was operated as an unlined dump from 1971 until 1984. In October 1967, the owners of the property, Philip W. Smith and A.E. Moran requested rezoning from the County of Loudoun to build 100 or more single family dwellings on the property (Attachment 1 to comment submitted by Kirby M. Bowers, County Administrator, Loudoun County, Virginia, EPA-HQ-SFUND-2007-0696-0012). Their request was denied. In 1971, Mr. Smith and Mr. Moran asked the Loudoun County Zoning Administrator if they could fill their land to bring it above flood level. Based on County of Loudoun Ordinance Section 9-8.1, "Land Subject to Flooding or Erosion", they were told that the ordinance did not prohibit a landowner from lawfully filling or otherwise improving his land.

Mr. Smith and Mr. Moran began filling the property "around February 1971," per a November 14, 1980, deposition taken by Mr. Smith. The first complaint of filling was received on May 17, 1971. A site inspection was conducted on May 18, 1971, in response to the complaint, which confirmed filing activities on the property. (EPA-HQ-SFUND-2007-0696-0012, Attachment 2). At no time did the owners indicate to the county that they intended to fill in the land with refuse; therefore, the dump essentially operated unregulated and did not comply with the rigid site requirements and operational procedures that sanitary landfills operate under. No engineering plans were ever submitted and a liner was not in place, waste was deposited directly on the underlying shale (Refs. 34; 35, p. 2; 39, p. 3). Once the filling operations began, the responsibility for regulating the dump was transferred from the Loudoun County Zoning Administrator to the County Health Department (Ref. 39, p. 3). Reports generated in 1973 regarding the dump indicated that the fill material deposited consisted of tree stumps, limbs, scrap

material such as bailed paper and cardboard, construction rubble, tires, and automobile and truck bodies, metal and wood. Also accepted were non-construction type materials such as household trash, oil drums, refrigerators, freezers, storage drums, fuel oil containers and paint cans (Refs. 21; 22; 39). An inspection conducted on November 8, 1973, by a sanitarian for the Bureau of Solid Waste and Vector Control, noted evidence that garbage and hazardous materials were being brought onto the property for disposal (Ref. 23). The practice of accepting solid waste for disposal at the dump continued through the 1970s. Large amounts of domestic refuse were observed in the fill during an inspection conducted in 1977. Mr. Smith informed the sanitarian that conducted the inspection that he was disposing of solid waste from the Town of Herndon (Ref. 24). In April 1977, an inspection of the dump revealed a large amount of trash from the Reston area including domestic refuse and containers originating from the USGS National Center. The USGS refuse was in the form of containers "containing liquid chemicals marked "toxic and poison" (Ref. 25). An inspection completed in December 1977 further documents the disposal of household refuse at the dump (Ref. 26). In May 1981, an inspection documented the disposal of 55-gallon drums that contained herbicide and pesticide residue (Ref. 27).

The Commonwealth of Virginia Department of Health (VDH) approved "in concept" a permit application in a letter to Mr. Smith and Mr. Moran, dated November 26, 1973, for operation of the solid waste disposal site pending receipt of a letter from the Loudoun County Board of Supervisors signifying its approval of the operation. However, no such letter from the Board of Supervisors was ever provided to VDH (EPA-HQ-SFUND-2007-0696-0012, Attachment 6). In a letter to Mr. Smith and Mr. Moran, dated September 6, 1974, VDH again approved "in concept" a permit for operation of a solid disposal site; this second letter did not stipulate that a letter from the Loudoun County Board of Supervisors was required (EPA-HQ-SFUND-2007-0696-0012, Attachment 7). On May 24, 1982, VDH issued Conditional Permit No. 356 for the operation of the Hidden Lane Landfill as a permitted debris landfill authorized to receive non-industrial, nonhazardous waste consisting of rubble, bricks, concrete, and lumber (Refs. 3, p. 2; 6, pp. 1-1 and 2-4; 7, p. 1; 28). VDH subsequently issued Commonwealth of Virginia Solid Waste Management Permit No. 356 to Mr. Elmer Wiser, a contract purchaser of the Hidden Lane landfill, for operation of a debris landfill on July 5, 1983 (Ref. 35; EPA-HQ-SFUND-2007-0696-0012, Attachments 8 and 9). In response to the State's issuance of Permit No. 356, the Loudoun County government filed a Petition for Appeal and Declaratory Judgment against the Virginia State Board of Health, the State Health Commissioner, the State Bureau of Solid Waste

Management, and Elmer Wise, the landfill operator at that time, challenging the State agency's authority to issue the permit. The County later dropped the suit, however, following the Loudoun County Circuit Court's October 1983 decision to close the landfill (EPA-HQ-SFUND-2007-0696-0012, Attachment 10).The Commonwealth Attorney in Loudoun County Circuit Court filed a criminal complaint of public and common nuisance suit against Mr. Smith and Mr. Moran on May 31, 1973; the owners were subsequently found not guilty by a jury of their peers (EPA-HQ-SFUND-2007-0696-0012, Attachment 3). The Loudoun County Zoning Administrator filed a second lawsuit, a Petition for Permanent Injunction, against Mr. Smith and Mr. Moran in November 1975. The filing stated that the landfill operation, which included the disposal of "construction rubble, solid industrial waste, tree stumps and limbs, baled scrap paper, used oil drums, used automobile tire and material appearing to be, and of the nature of, household trash," was not allowed under the Loudoun County Zoning Ordinance. The Court subsequently dismissed the suit without prejudice at the request of the Commonwealth Attorney (EPA-HQ-SFUND-2007-0696-0012, Attachment 4). Subsequently, in February 1976, the Loudoun County Zoning Administrator again filed a Petition for Permanent Injunction against Mr. Smith and Mr. Moran (EPA-HQ-SFUND-2007-0696-0012, Attachment 5). The court granted the permanent injunction and ordered the closure of the landfill in a decision issued on October 4, 1983 (Ref. 35; EPA-HQ-SFUND-2007-0696-0012, Attachment 5).

Although only permitted to receive construction debris, the dump continued to accept household waste, as documented in a 1983 inspection of the dump completed by the County of Loudoun, Department of Public Health. On April 5, 1983, the county inspector opened the tailgate of a truck and observed a large amount of household refuse and trash, with a minimal amount of construction debris placed on top, possibly to camouflage the true nature of the waste. The inspector also noted at this time a large pond of black liquid in a pit at the dump. The inspector informed the dump foreman that solid waste could not be disposed of at the dump. The dump received an unsatisfactory rating at this time (Ref. 29).

VDH, Bureau of Solid Waste Management conducted a preliminary assessment (PA) of the Hidden Lane Landfill on November 13, 1984. At the time of the PA, the dump was in the process of being covered with a clay cap. Approximately, three-fourths was already covered at this time. Further investigation was recommended due to the presence of low levels of potentially hazardous pollutants (Ref. 7, pp. 1, 2).

SITE SUMMARY (Continued)

On February 16, 1988, EPA's Region 3 Field Investigation Team (FIT3) contractor, NUS Corporation (NUS) conducted a site inspection (SI) of the Hidden Lane Landfill site (Ref. 6). The sampling event included the collection of ground water samples from four monitoring wells at the dump, aqueous and sediment samples from two leachate seeps, one soil sample from the dump in an area not capped, three ground water samples collected from adjacent residential wells, and sediment samples from an intermittent stream that was observed flowing west to east, north of the dump (Ref. 6, Table 5-3, pp. 5-5 and 5-6). All samples were analyzed under EPA's Contract Laboratory Program (CLP) for Target Compound List (TCL) volatile organic compounds (VOC), semivolatile organic compounds (SVOC), polychlorinated biphenyls (PCB), pesticides, and Target Analyte List (TAL) metals and cyanide. SVOCs including phenanthrene (95 micrograms per kilogram [µg/kg]), fluoranthene (110 µg/kg), pyrene (84 µg/kg) and the pesticide chlordane (24 µg/kg) were detected in one of the solid leachate samples collected. Ground water samples were collected from three domestic residential wells located west of the landfill, along Redrose Drive. Sample results indicated 7 micrograms per liter (µg/L) of trichloroethylene (TCE) in a residential well located approximately 300 feet west of the center of the dump, and 70 µg/L of TCE, 3 µg/L of 1,1-dichloroethene and 7 µg/L of 1,1,1-trichloroethane in the ground water sample collected from a residential well located 600 feet from the northwestern corner of the dump. These concentrations of TCE exceeded EPA's maximum contaminant level (MCL) established for TCE of 5 µg/L. A ground water sample collected from a residential well located to the south of the landfill, topographically upgradient, did not have detectable concentrations of TCE (Refs. 6, Table 5-3, 5-5 through 5-8 and Section 7.0; 9).

The Loudoun County Department of Technical Services tasked CH2M Hill to install 14 landfill gas monitoring wells between the Hidden Lane Landfill and the Countryside community in 1988. Analytical results of three gas samples collected in September 1988 document the presence of several VOCs including carbon tetrachloride (up to 0.17 parts per billion [ppb]), 1,1,1-trichloroethane (up to 14 ppb), TCE (up to 380 ppb), tetrachloroethylene (up to 0.53 ppb), and toluene (up to 30 ppb) (Ref. 33, pp. 1, 4, 5 and 6).

In April 1995, analysis of a newly-installed well located at 20240 Redrose Drive, directly west of the dump, indicated elevated levels of TCE (1 µg /L). In 1997, a second sample from this well was also collected. Laboratory analysis of this sample also revealed elevated levels of TCE (5 µg /L) (Ref. 31). Altogether, in the 16 years following the 1988 EPA sampling event, Loudoun

County discovered TCE-contamination in five new wells installed in the Broad Run Farms development. As a response to this documented TCE-contamination, in February and March of 2005, the Loudoun County Department of Health sampled additional existing residential wells in the Broad Run Farms neighborhood. This sampling revealed a total of 25 wells contaminated with TCE, 16 of these wells contained concentrations of TCE at or above EPA's MCL of 5 µg/L (Refs. 8 and 9).

In October 2005, EPA Region 3 tasked Tetra Tech EM Inc. to complete an integrated site assessment of the Hidden Lane Landfill. As part of the site assessment surface and subsurface soil, surface water, sediment and nearby residential wells were sampled. TCE was detected in surface and subsurface soil samples collected adjacent to the Hidden Lane Landfill and also in downgradient residential wells (Ref. 3).

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 1
Name of source: Hidden Lane Landfill
Description: Pile

The source evaluated is a 29.6-acre dump (Refs. 3, Figures 1 and 2; 4; 5; Figure 1 and Section 2.4.2.1.4 of HRS documentation record). The source was operated as an unlined dump from 1971 until 1984. Historical inspection reports indicate that during the entire time the dump was active it accepted various types of wastes including solid and hazardous waste such as pesticide and herbicide containers, 55-gallon drums and paint cans. As documented in the Site Summary section of this documentation record, between November 1973 and September 1974, the Hidden Lane landfill operated under the authority of a letter from VDH approving the permit application "in concept," pending written approval from the Loudoun County Board of Supervisors. The dump was subsequently operated under the authority of another letter from VDH that approved the permit application "in concept" that did not contain the stipulation for written approval from the Loudoun County Board of Supervisors. The dump operated under a conditional debris landfill permit (Conditional Permit No. 356) from May 1982 until July 1983, at which time VDH issued Commonwealth of Virginia Solid Waste Management Permit No. 356 for operation of a debris landfill. Although only authorized to accept construction debris, inspection reports indicate that solid waste continued to be dumped on the property until its court-ordered closure in 1984 (Refs. 10; 21; 22; 23; 24; 25; 26; 27; 28; 29; 34; 35 and 39). The director of engineering for Loudoun County that was responsible for inspecting all of the landfills located in the county during this time indicated that during inspections he observed waste that the dump was not authorized to accept, such as latex and enamel paint cans, tires, junk cars and drums (Ref. 10).

Location: Off of Persimmon Lane, approximately ¾ mile north of Route 7 (Ref. 3, Figures 1 and 2, pp. 3 and 4).

Containment:

Release to ground water: Migration of hazardous substances from the source area has been documented; therefore, a containment factor value of 10 is assigned to this source (See Section

3.0 of this HRS documentation record). Additionally, there was no evidence of a liner or containment system installed at the dump (Refs. 1, Table 3-2; 10; 35, p. 2).

Release via overland migration and/or flood: The surface water migration pathway was not scored.

Gas release to air: The air migration pathway was not scored.

Particulate release to air: The air migration pathway was not scored.

2.4.1 Hazardous Substances

Evidence that hazardous substances were deposited into the Hidden Lane Landfill can be found in historical inspection reports and laboratory analytical results from samples collected from the dump and surrounding area. Inspection reports indicate all types of solid wastes were deposited at the dump including oil cans, herbicide and pesticide containers, 55-gallon drums and paint cans (Refs. 10; 21; 22; 23; 24; 25; 26; 27; 28; 29; 34; 35 and 39).

Evidence that hazardous substances were deposited at the landfill is also provided by analytical data. In 1988, EPA's FIT collected leachate samples from the Hidden Lane Landfill. As shown in the table below, SVOCs, including phenanthrene, fluoranthene, pyrene, and the pesticide chlordane were detected in a solid leachate sample (Ref. 6, Table 5.3 and pp. 5-5 and 7-9). In September 1988, Loudoun County collected and analyzed two gas samples from adjacent residential properties and one gas sample from the dump. Analytical results document the presence of several VOCs including carbon tetrachloride (up to 0.17 ppb), 1,1,1-trichloroethane (up to 14 ppb), TCE (up to 380 ppb), tetrachloroethylene (up to 0.53 ppb), and toluene (up to 30 ppb) (Ref. 33, pp. 1, 4, 5 and 6).

Additional analytical evidence that hazardous substances were deposited at the dump, and have migrated through the soil column is provided by the results of the EPA integrated site assessment completed at the Hidden Lane Landfill in 2005 (Ref. 3). Soil samples were collected from soil borings installed on the Hidden Lane Landfill property around the perimeter of the mounded area. As described in Section 3.1.1 of this HRS documentation record, surface sediments at the Hidden Lane Landfill consist of Tertiary to Quaternary sand, gravel, and boulder terrace deposits. Average depth of the terrace deposits is 10 feet, with a range of 7 to 20 feet. Directly underlying the surface sediment deposits is the Balls Bluff Siltstone bedrock (Refs. 6, p. 3-3; 17; 14, Map I-2553 and p. 29). TCE is heavier than water; therefore, a spill of sufficient magnitude is likely to

move downward through the subsurface until lower permeability features impedes its progress (Ref. 51, pp. 1, 2, 3). Therefore, TCE and volatile organic compounds deposited into the dump would be expected to migrate downward through the soil column until an impermeable layer, such as a bedding parting or unfractured portion of the Balls Bluff Siltstone is encountered, thereby increasing the areal extent of the contamination.

As shown in the following table, hazardous substances detected in these samples include TCE, SVOCs and PCBs. The SVOCs phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthatlate, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene were also detected.

The following table summarizes the analytical data obtained from the EPA 1988 SI and the 2005 integrated assessment. Source sample locations are shown in Figure 2, page 12 of this HRS documentation record. Samples collected during these events were analyzed under EPA's CLP program for TCL VOCs, TCL SVOCs, PCBs, pesticides, and TAL metals and cyanide (Refs. 6, Section 7.0; 3, p. 17).

Hazardous Substance	Date Collected	Source	Evidence	Concentration (µg/kg)	CRQL (µg/kg)	Reference
Trichloroethene	10/4/2005	1	SS-02	7 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 18, App. D; 58, p. 55
	10/4/2005	1	SS-03	5 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 18, App. D; 58, p. 2
	10/4/2005	1	SS-04	9 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 21, App. D; 58, p. 5
	10/4/2005	1	SS-05	4 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 21, App. D; 58, p. 8
	10/4/2005	1	BS-02	5 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 21, App. D; 58, p. 11
	10/5/2005	1	BS-14	4 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 27, App. D; 58, p. 14
	10/6/2005	1	BS-15	4 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 27, App. D; 58, p. 17
	10/6/2005	1	BS-17	5 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 27, App. D; 58, p. 20

Hazardous Substance	Date Collected	Source	Evidence	Concentration (µg/kg)	CRQL (µg/kg)	Reference
	10/6/2005	1	SS-16	3 J	10	3, pp. 7, 9, App. C; 11, pp.1 through 15, 29, App. D; 58, p. 23
bis(2-ethylhexyl)phthalate	10/4/2005	1	SS-06	81 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 44, App. D; 58, p. 26
	10/4/2005	1	BS-06	45 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 44, App. D; 58, p. 29
	10/6/2005	1	BS-18	15000 +	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 32
bis(2-ethylhexyl)phthalate	10/5/2005	1	BS-08	170 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 44, App. D; 58, p. 35
	10/6/2005	1	SS-18	230 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Pyrene	2/17/1988	1	LD-1	84 J	10	6, pp. 7-9, Section 7.0 and App B, p. 1; 53, p. 8; 54
	10/6/2005	1	BS-15	180 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
	10/5/2005	1	SS-14	55 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	93 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44
	10/6/2005	1	SS-17	65 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 50
	10/6/2005	1	SS-18	260 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Chrysene	10/6/2005	1	BS-15	240 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
	10/5/2005	1	SS-14	110 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	140 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44
	10/6/2005	1	SS-18	300 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Phenanthrene	10/6/2005	1	BS-15	180 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
	10/5/2005	1	SS-14	97 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	97 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44

Hazardous Substance	Date Collected	Source	Evidence	Concentration (µg/kg)	CRQL (µg/kg)	Reference
	10/6/2005	1	SS-18	230 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
	2/17/1988	1	LD-1	95 J	10	6, pp. 7-9, Section 7.0 and App B, p. 1; 53, p. 8; 54
Anthracene	10/6/2005	1	SS-18	74 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Fluoranthene	10/6/2005	1	BS-15	490 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
Fluoranthene	10/5/2005	1	SS-14	220 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	270 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44
	10/6/2005	1	SS-18	530	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
	2/17/1988	1	LD-1	110 J	10	6, pp.7-9, Section 7.0 and App, B, p. 1; 53, p. 8; 54
Benzo(a)pyrene	10/6/2005	1	SS-18	61 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Benzo(a)anthracene	10/6/2005	1	BS-15	230 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
	10/5/2005	1	SS-14	100 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	130 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44
	10/6/2005	1	SS-18	300 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Benzo(b)fluoranthene	10/6/2005	1	BS-15	220 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
	10/5/2005	1	SS-14	85 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	130 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44
	10/6/2005	1	SS-18	270 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Indeno(1,2,3-cd)pyrene	10/6/2005	1	BS-15	58 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
	10/6/2005	1	SS-18	84 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38

Hazardous Substance	Date Collected	Source	Evidence	Concentration (µg/kg)	CRQL (µg/kg)	Reference
Dibenzo(a,h)anthracene	10/6/2005	1	SS-18	110 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Benzo(k)fluoranthene	10/5/2005	1	SS-14	62 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 41
	10/6/2005	1	SS-15	120 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 50, App. D; 58, p. 44
	10/6/2005	1	SS-18	240 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 56, App. D; 58, p. 38
Benzo(k)fluoranthene	10/6/2005	1	BS-15	160 J	330	3, pp. 7, 9, App. C; 11, pp.1 through 15, 48, App. D; 58, p. 58
Aroclor-1260	10/3/2005	1	BS-01	12 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 57, App. D; 58, p. 52
Aroclor-1242	10/6/2005	1	BS-15	910 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 62, App. D; 58, p. 53
Aroclor-1248	10/6/2005	1	BS-15	1500 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 62, App. D; 58, p. 53
	10/5/2005	1	SS-14	20 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 63, App. D; 58, p. 60
Aroclor-1254	10/6/2005	1	BS-15	220 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 62, App. D; 58, p. 53
	10/5/2005	1	SS-14	17 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 63, App. D; 58, p. 60
Aroclor-1260	10/6/2005	1	BS-15	73 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 62, App. D; 58, p. 53
	10/5/2005	1	SS-14	64 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 63, App. D; 58, p. 60
	10/6/2005	1	SS-15	76 J	33	3, pp. 7, 9, App. C; 11, pp.1 through 15, 63, App. D; 58, p. 61

Notes:
µg/kg micrograms per kilogram
SS Surface Soil
BS Subsurface Soil
LD Solid leachate sample
J Analyte present. Reported value may not be accurate or precise.
+ Result reported from diluted sample.

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The information available is not sufficient to adequately support the evaluation of the hazardous constituent quantity for Source No. 1.

Sum (pounds): Unknown
Hazardous Constituent Quantity Value (C): Not evaluated (NE)

2.4.2.1.2 Hazardous Wastestream Quantity

The information available is not sufficient to adequately support the evaluation of the hazardous waste stream quantity for Source No. 1.

Sum (pounds): Unknown
Hazardous Waste Stream Quantity: NE

2.4.2.1.3 Volume

The information available is not sufficient to adequately support the evaluation of the volume of hazardous waste for Source No. 1.

Dimensions of source (cubic yards [yd^3] or gallons): Unknown
Volume Assigned Value: 0

2.4.2.1.4 Area

The area of the dump is based on the estimated size of the area that was filled. According to available information, the dump was 30 acres in size (Ref. 7, p. 1). The dump appears as a mounded area on an aerial photograph of the area (see Figure 1, Source Location Map, page 11 of this HRS documentation record). The area of this mound has been calculated using ArcGIS computer software to be 29.6 acres. To calculate the assigned value, 29.6 acres was used to determine the area value of the pile.

Area of Source (square feet): 1,289,376
Area Assigned Value (Area/13): 99,182.77
(Ref. 1, Section 2.4.2.1.4)

2.4.2.1.5 Source Hazardous Waste Quantity Value

Hazardous constituent quantity, hazardous wastestream quantity, or volume of source 1 cannot be determined with available information; therefore, the source hazardous waste quantity value is based on the area assigned value of 99,182.77 (Ref. 1, Section 2.4.2.1.5).

2.4.2.2 Hazardous Waste Quantity Factor Value

The hazardous waste quantity factor value (HWQ) is based on the hazardous waste quantity value assigned for source 1 of 99,182.77. The assigned value is therefore 10,000 (Ref. 1, Table 2-6).

Hazardous Waste Quantity (HWQ) Value: 10,000

3.0 GROUND WATER MIGRATION PATHWAY

3.0.1 GENERAL CONSIDERATIONS

The Hidden Lane Landfill is located within the northern part of the Culpeper basin of the Piedmont physiographic province. The Culpeper Basin is an elongate, north-northeast-trending, fault-bounded trough extending from south-central Maryland to northern Virginia. The basin fill consists of Upper Triassic to Lower Jurassic nonmarine sedimentary rocks belonging to the Culpeper Group. The lower two formations of the Culpeper Group, the Balls Bluff Siltstone and the Manassas Sandstone, are present beneath the Hidden Lane Landfill. The Culpeper Basin is likely underlain by an unconformity with Paleozoic basement rocks (Refs. 12, pp.1, 3, 12, 13, 14, 16 and 17; 13, pp. 1, 1a, 2 and 13; 14, Map I-2553 and pp. 1, 26 and 29).

Aquifer/Stratum Name: Tertiary to Quaternary terrace deposits

Description:

Surface sediments at the Hidden Lane Landfill consist of Tertiary to Quaternary sand, gravel, and boulder terrace deposits. Average depth of the terrace deposits is 10 feet, with a range of 7 to 20 feet (Refs. 6, p. 3-3; 17; 14, Map I-2553 and p. 29).

Shallow ground water is present in the surface deposits near the Hidden Lane Landfill. The sand and gravel deposits make up a relatively continuous, free-draining system of interconnected lenses and layers of highly permeable soils. Monitoring well data obtained from Hidden Lane Landfill indicate that depth to shallow ground water is between 6.5 and 10 feet below ground surface (bgs) and that under normal conditions flow is to the north towards the Potomac River. However, data indicate that when recharge is low (hot, dry, frozen ground surface or snow cover) the perched water table existing under the dump drains downward or laterally and will eventually dissipate if recharge does not occur. Even during periods of high water table conditions portions of the underlying sand and gravel stratum remain partially drained (Ref. 6, p. 3-7 and Appendix D; 7, p. 9; 15, Map I-1313-F; 17; 32, pp. 1, 6, 7, 8, and 9).

Aquifer/Stratum Name: **Balls Bluff Siltstone**

Description:

The surface deposits are underlain by the Balls Bluff Siltstone formation in the lower part of the Culpeper Group. The Balls Bluff siltstone consists of grayish red and dusky red calcareous siltstone and fine-grained sandstone locally intercalated with thin lenses of limestone and gray dolomite. In the vicinity of the Hidden Lane Landfill the Balls Bluff Siltstone is approximately 4,000 feet thick (Refs. 12, pp. 16, 17, and 18; 13, pp. 1, 1a, 2, and 13; 14, Map I-2553, pp. 26 and 27).

Balls Bluff Siltstone is the most productive aquifer in the vicinity of the Hidden Lane Landfill. The aquifer is considered highly permeable. The Balls Bluff Siltstone aquifer consists of closely spaced, interconnected fractures, joints, and bedding plane partings. These water-bearing features generally extend for no more than a few miles. The primary source of ground water in the aquifer is precipitation with water infiltrating the thin surface deposits, passing through fractured siltstone and moving from the uplands (recharge areas) toward the valleys (discharge areas). In the vicinity of the Hidden Lane Landfill, ground water flow in the Balls Bluff Siltstone is generally from south to north, towards the Potomac River (Refs. 15, Map I-1313-F; and 16).

Well logs obtained from 19 residential wells located adjacent to the Hidden Lane Landfill and completed in the Balls Bluff Siltstone were reviewed. The logs indicated that the depth to the Balls Bluff Siltstone was typically encountered at 7 to 20 feet bgs. Total well depths ranged from 160 to 340 feet bgs. Static water levels in the wells ranged from 18 to 50 feet and predominately occurred at 30 feet. Water producing zones were encountered at various depths ranging from 65 to 290 feet bgs (Ref. 17, pp. 1 through 72).

Aquifer/Stratum Name: Manassas Sandstone

Description:

The Balls Bluff Siltstone is underlain by the Manassas Sandstone, the lowermost formation of the Culpeper Group. The Manassas Sandstone is gray to pinkish-gray to reddish-brown fine to coarse-grained arkosic and micaceous sandstone with locally pebbly beds and a basal conglomerate. The main part of the Manassas Sandstone is up to 3,000 feet thick and the basal conglomerate is up to 70 feet thick (Refs. 12, pp.1, 12, 13, 14; 13, p. 14; 14, Map I-2553 and pp. 1 and 26).

The Manassas Sandstone also hosts a water-bearing aquifer. However, the sandstone is more thickly bedded and less fractured than the siltstone and has significantly lower permeability. Additionally, ground water from the Manassas Sandstone is described as very hard and sulfate rich (Refs. 15, Map I-1313-F).

Depth to the Manassas Sandstone in the vicinity of the Hidden Lane Landfill is expected to be as much as 4,000 feet and no logs for wells completed in the Manassas Sandstone in the immediate vicinity of the dump were available (Refs. 14, Map I-2553; 15, Map I-1313-F).

The basal conglomerate unit of the Manassas Sandstone is utilized for ground water north of the Hidden Lane Landfill in Maryland. This area is within the 4-mile target distance of the Hidden Lane Landfill. However, the Manassas Sandstone aquifer in Maryland is separated from the Hidden Lane Landfill by the Potomac River and is not thought to be directly interconnected with the aquifer system below the Hidden Lane Landfill (Ref. 15, Map I-1313-F; 52). Only wells located within the Balls Bluff Siltsone aquifer have been evaluated in the sections below because the number of potential targets (35) potentially affected in the Manassas Sandstone aquifer (Refs. 48, 49 and 50) would not affect the site score.

3.1 LIKELIHOOD OF RELEASE

3.1.1 OBSERVED RELEASE

Aquifer Being Evaluated: Balls Bluff Siltstone

The aquifer evaluated is the Balls Bluff Siltstone. As documented in the section above, this aquifer underlies the Hidden Lane Landfill and is the major aquifer used for potable water within a 4-mile distance of the Hidden Lane Landfill.

Chemical Analysis:

In 1988, EPA Region 3's FIT collected ground water samples from three domestic wells located along Redrose Drive. Well depths ranged from 150 to 215 feet, indicating they were drilled within the Balls Bluff Siltstone aquifer (Ref. 6, Appendix E). The samples were analyzed under EPA Region 3's CLP for full organics (Ref. 6, p. 7-2). Sample results indicated 7 µg/L of TCE in a residential well located approximately 300 feet west of the center of the Hidden Lane Landfill, and 70 µg/L of TCE, 3 µg/L of 1,1-dichloroethene and 7 µg/L of 1,1,1-trichloroethane in the ground water sample collected from a residential well located 600 feet from the northwestern corner of the dump, at the northern end of Redrose Drive. An upgradient residential well sample did not have detectable concentrations of TCE, 1,1-dichloroethene or 1,1,1-trichloroethane (Ref. 6, pp. 5-4, 5-6, 7-8 and Appendix E).

Loudoun County requires testing to determine if contaminates are present in newly installed wells. In April 1995, analysis of a newly-installed well located at 20240 Redrose Drive, directly west of the dump, indicated elevated levels of TCE (1 µg/L). A sample from this well was also collected in 1997. Laboratory analysis of this sample revealed elevated levels of TCE (5 µg/L) (Ref. 31). Altogether, in the 16 years following the 1988 EPA sampling event, Loudoun County discovered TCE-contamination in five new wells installed in the Broad Run Farms development. As a response to this documented TCE-contamination, in February and March of 2005, the Loudoun County Department of Health sampled additional existing residential wells in the Broad Run Farms neighborhood. This sampling revealed a total of 25 wells contaminated with TCE, 16 of these wells contained concentrations of TCE at or above EPA's MCL of 5 µg/L (Refs. 8 and 9).

As part of the integrated assessment, Tetra Tech collected samples from 40 residential wells in October 2005. Fourteen of the residential wells sampled had treatment systems. Two samples were collected

from each residence that had a treatment system on their well, one before and one after treatment (Refs. 3, pp. 9 and 10; 17, pp. 62 through 66).

In January 2007, Tetra Tech returned to Hidden Lane Landfill to collect ground water samples to determine if contamination was present upgradient of the source (Ref. 18, p. 2). On January 22 and 23, 2007, Tetra Tech collected residential well samples from 3 homes located upgradient of the Hidden Lane Landfill (Ref. 18, p. 4). Site related contaminant levels in these upgradient samples were not found at levels at or above detection limits (see background concentration table below).

Background Concentrations:

Background concentrations are provided by residential wells located upgradient to the Hidden Lane Landfill and drilled within the Balls Bluff Siltstone (Ref. 17, pp. 1, 5, 6, 59, 60 and 62). The background wells did not have any treatment systems installed and were analyzed by an EPA Region 3 CLP laboratory for TCL VOCs, TCL SVOCs, PCBs, pesticides, TAL metals and cyanide (Refs. 3, pp. 9 and 17; 20, p. 3; 18, pp. 5 and 6; 57, p. 3). The background wells are comparable to the contaminated wells because they are located within the same fractured bedrock aquifer as the contaminated wells (the Balls Bluff Siltstone) were sampled by the same Tetra Tech personnel, under the same sampling standard operating procedures and were analyzed under the same EPA CLP procedures (Refs. 3, pp. 16 and 17, App. C; 17, pp. 1 through 72; 19, pp. 1 through 8, 16 and App. D; 18, pp. 4 and 5; 36, pp. 1 through 3, 7, App. D; 56; 57).

BACKGROUND LOCATIONS

Sample ID	Depth (feet)	Date	References
004-PW-04	300	10/3/2005	3, p. 9; 17, pp. 1, 5, 6, 62, 63; 56, p. 14
RW-1	275	1/22/2007	18, pp. 5 and Figure 2; 17, pp. 1, 67, 68, 69; 57, pp. 2 and 3
RW-2	300	1/23/2007	18, pp. 5 and Figure 2; 17, pp. 1, 70, 71, 72; 57, pp. 2 and 3
RW-3	340	1/22/2007	18, pp. 5 and Figure 2; 17, pp. 1, 59, 60, 61; 57, pp. 2 and 3

BACKGROUND CONCENTRATIONS

Sample ID	Hazardous Substance	Concentration	CRQL (µg/L)	Reference
004-PW-04	Trichloroethene	ND	0.5	20, p. 15
	1,1,1-Trichloroethane	ND	0.5	20, p. 15
	cis-1,2-Dichloroethene	ND	0.5	20, p. 15
	1,1-Dichloroethene	ND	0.5	20, p. 15
RW-1	Trichloroethene	ND	0.5	18, p. 6; 36, pp. 1 through 3, 7, App. D
	cis-1,2-Dichloroethene	ND	0.5	
	1,1,1-Trichloroethane	ND	0.5	
	1,1-Dichloroethene	ND	0.5	
RW-2	Trichloroethene	ND	0.5	18, p. 6; 36, pp. 1 through 3, 7, App. D
	cis-1,2-Dichloroethene	ND	0.5	
	1,1,1-Trichloroethane	ND	0.5	
	1,1-Dichloroethene	ND	0.5	
RW-3	Trichloroethene	ND	0.5	18, p. 6; 36, pp. 1 through 3, 7, App. D
	cis-1,2-Dichloroethene	ND	0.5	
	1,1,1-Trichloroethane	ND	0.5	
	1,1-Dichloroethene	ND	0.5	

Notes:
µg/L = micrograms per liter
CRQL = contract required quantitation limit
ND = not detected above contract-required quantitation limits

Contaminated Samples:

The contaminated samples shown below were collected and analyzed in October 2005, during the integrated assessment completed at the Hidden Lane Landfill. All wells are located within the Balls Bluff Siltstone aquifer (Ref. 18, Figure 2). The locations of the wells are shown in a figure included in Reference 17. The samples were analyzed by an EPA Region 3 CLP laboratory for TCL VOCs, TCL SVOCs, PCBs, pesticides, TAL metals and cyanide.

Sample Identifier	Depth (feet)	Sample Date	References
003-PW-03	200	10/3/2005	3, p. 9; 17, pp. 2, 3, 62, 63; 56, p. 1
007-PW-07	225	10/3/2005	3, p. 9; 17, pp. 11, 12, 62, 63; 56, p. 2
011-PW-11	160	10/4/2005	3, p. 9; 17, pp. 20, 21, 62, 63; 56, p. 3
012-PW-12	Unknown*	10/4/2005	3, p. 9; 17, pp. 62, 63; 56, p. 4
018-PW-18	180	10/4/2005	3, p. 10; 17, pp. 62, 64; 56, p. 5
020-PW-20	200	10/5/2005	3, p. 10; 17, pp. 62, 64; 56, p. 6
021-PW-21	125	10/5/2005	3, p. 10; 17, pp. 62, 64; 56, p. 7
026-PW-26	210	10/5/2005	3, p. 10; 17, pp. 62, 65; 56, p. 8
032-PW-32	150	10/5/2005	3, p. 10; 17, pp. 38, 39, 62, 65; 56, p. 9
034-PW-34	250	10/6/2005	3, p. 10; 17, pp. 41, 42, 62, 65; 56, p. 10
036-PW-36	Unknown*	10/6/2005	3, p. 10; 17, pp. 62, 65; 56, p. 11
039-PW-39	340	10/6/2005	3, p. 10; 17, pp. 50, 51, 62, 66; 56, p. 12
040-PW-40	240	10/6/2005	3, p. 10; 17, pp. 53, 54, 62, 66; 56, p. 13

Notes:
* = Well logs are not available for these locations. These wells are located within the Balls Bluff Siltstone, in close proximity to the wells shown with known depths; therefore, they are most likely between the known ranges of wells in this area, 150 to 340 feet bgs. The majority of wells drilled into the Ball Bluff Siltstone aquifer occur at less than 500 feet bgs (Refs. 3, Figure 3; 14, Map I-2553; 15; 17).

Sample Identifier*	Date Collected	Hazardous Substance	Concentration (µg/L)	CRQL (µg/L)	Reference
003-PW-03A	10/3/2005	Trichloroethene	1.7	0.5	3, p. 9, App. C; 20, pp. 1 through 8, 15 and App. D; 59, p. 2
007-PW-07A	10/3/2005	Trichloroethene	0.77	0.5	3, p. 9, App. C; 20, pp. 1 through 8, 17 and App. D; 59, p.5
011-PW-11A	10/4/2005	Trichloroethene	39 +	1.0	3, p. 9, App. C; 19, pp. 1 through 8, 12 and App. D; 59, p.23
		1,1,1-Trichloroethane	0.68	0.5	3, p. 9, App. C; 19, pp. 1 through 8, 12 and App. D; 59, p.19
012-PW-12A	10/4/2005	Trichloroethene	130 +	5.0	3, p. 9, App. C; 19, pp. 1 through 8, 12 and App. D; 59, p.29
		1,1,1-Trichloroethane	3.3	0.5	3, p. 9, App. C; 19, pp. 1 through 8, 12 and App. D; 59, p.25
		1,1-Dichloroethene	7.4	0.5	3, p. 9, App. C; 19, pp. 1 through 8, 12 and App. D; 59, p.25
018-PW-18A	10/4/2005	Trichloroethene	110 +	7.5	3, p. 9, App. C; 19, pp. 1 through 8, 16 and App. D; 59, p.35
		1,1-Dichloroethene	6.5	0.5	3, p. 9, App. C; 19, pp. 1 through 8, 16 and App. D; 59, p.31
		1,1,1-Trichloroethane	3.1	0.5	3, p. 9, App. C; 19, pp. 1 through 8, 16 and App. D; 59, p.31
		cis-1,2-Dichloroethene	0.86	0.5	3, p. 9, App. C; 19, pp. 1 through 8, 16 and App. D; 59, p.31
020-PW-20B	10/5/2005	Trichloroethene	3.3	0.5	3, p. 9, App. C; 20, pp. 1 through 8, 11 and App. D; 59, p.50
021-PW-21A	10/5/2005	Trichloroethene	20	0.5	3, p. 9, App. C; 20, pp. 1 through 8, 11 and App. D; 59, p.8
		1,1-Dichloroethene	0.87	0.5	3, p. 9, App. C; 20, pp. 1 through 8, 11 and App. D; 59, p.7

026-PW-26A	10/5/2005	Trichloroethene	31 +	1.0	3, p. 10, App. C; 19, pp. 1 through 8, 18 and App. D; 59, p.56
		1,1-Dichloroethene	2.7	0.5	3, p. 10, App. C; 19, pp. 1 through 8, 18 and App D; 59, p.16
		1,1,1-Trichloroethane	1.1	0.5	3,p. 10, App. C; 19, pp. 1 through 8, 18 and App D; 59, p.16
032-PW-32A	10/5/2005	Trichloroethene	18	0.5	3,p. 10, App. C; 19, pp. 1 through 8, 22 and App D; 59, p.11
		1,1-Dichloroethene	0.78	0.5	3, p. 10, App. C; 19, pp. 1 through 8, 22 and App D; 59, p.10
034-PW-34A	10/6/2005	Trichloroethene	26 +	1.0	3, p. 10, App. C; 19, pp. 1 through 8, 22 and App D; 59, p.53
		1,1-Dichloroethene	0.77	0.5	3, p. 10, App. C; 19, pp. 1 through 8, 22 and App D; 59, p.13
		1,1,1-Trichloroethane	0.66	0.5	3,p. 10, App. C; 19, pp. 1 through 8, 22 and App D; 59, p.13
036-PW-36C (A)**	10/6/2005	Trichloroethene	49 +	2.5	3, p. 10, App. C; 19, pp. 1 through 8, 24 and App D; 59, p.41
		1,1-Dichloroethene	1.4	0.5	3, p. 10, App. C; 19, pp. 1 through 8, 24 and App D; 59, p.37
		1,1,1-Trichloroethane	0.85	0.5	3, p. 10, App. C; 19, pp. 1 through 8, 24 and App D; 59, p.37
039-PW-39A	10/6/2005	Trichloroethene	2.4	0.5	3, p. 10, App. C; 20, pp. 1 through 8, 19 and App D; 59, p.44
040-PW-40A	10/6/2005	Trichloroethene	6.9	0.5	3, p. 10, App. C; 20, pp. 1 through 8, 21 and App D; 59, p.47

Notes:
+ = Result reported from diluted sample
* = All samples collected before the well treatment system, or at location with no treatment system (Ref. 3, Table 1)
** = Sample designated by A and C are duplicate samples. The lowest concentration reported has been shown (Ref. 3, Table 1).
CRQL = Contract-required quantitation limit

Level I Samples:

The ground water samples shown in the contaminated samples documentation above were collected from residential wells that are used for drinking water. Some of the contaminated wells have treatment systems to treat the ground water prior to use. Not all of the contaminated wells have treatment systems. To determine Level I targets, the concentrations of hazardous substances detected in the ground water samples are compared to EPA's drinking water benchmarks (Refs. 1, Section 3.3.1; 9).

LEVEL I DRINKING WATER WELLS

Sample ID	Hazardous Substance	Concentration (µg/L)	Benchmark Concentration (µg/L)	Benchmark	Reference
011-PW-11A	Trichloroethene	39 +	5	MCL	2; 9
012-PW-12A	Trichloroethene	130 +	5	MCL	2; 9
018-PW-18A	Trichloroethene	110 +	5	MCL	2; 9
021-PW-21A	Trichloroethene	20	5	MCL	2; 9
026-PW-26A	Trichloroethene	31 +	5	MCL	2; 9
032-PW-32A	Trichloroethene	18	5	MCL	2; 9
034-PW-34A	Trichloroethene	26 +	5	MCL	2; 9
036-PW-36C (A)**	Trichloroethene	49 +	5	MCL	2; 9
040-PW-40A	Trichloroethene	6.9	5	MCL	2; 9
003-PW-03A	Trichloroethene	1.7	0.21	CRSC	2
007-PW-07A	Trichloroethene	0.77	0.21	CRSC	2
020-PW-20B	Trichloroethene	3.3	0.21	CRSC	2
039-PW-39A	Trichloroethene	2.4	0.21	CRSC	2

Notes:
+ = Result reported from diluted sample
MCL = Maximum contaminant level
CRSC = Cancer Risk Screening Concentration
** = Sample designated by A and C are duplicate samples. The lowest concentration reported has been shown.

Attribution:

VOCs, including TCE, 1,1-dichloroethene, 1,2-dichloroethene and 1,1,1-trichloroethane have been detected in ground water samples collected from residential wells located downgradient of the Hidden Lane Landfill. As documented in the source description section of this HRS documentation record, TCE has also been detected in gas and soil samples collected from the dump or nearby vicinity. The review of the hydrogeology of the area (as discussed in 3.0.1, General Considerations) indicates that ground water is expected to flow in a northern direction from the dump towards the Potomac River; therefore the contaminated wells are located downgradient of the dump. Further evidence that the Hidden Lane Landfill is the source of the TCE contamination detected in the downgradient residential wells is provided by the results of ground water samples collected from residential wells located upgradient of the dump, which did not reveal contamination. These wells would be downgradient from any source located directly south of the dump; therefore, if a separate source existed in the area, these wells would likely be impacted.

To determine if any other potential sources of the VOCs existed in the area prior to 1988 (the initial date the residential wells were known to have been impacted), a review of federal and state database records were reviewed. Several leaking underground storage tanks or spills were reported in the vicinity of the Hidden Lane Landfill. The sites listed in the vicinity were determined to be leaking fuel oil tanks, with the exception of a site listed due to an unknown odor (no further action determination) and the Hidden Lane Landfill site. This Hidden Lane Landfill site was listed on the state database due to the contaminated residential wells located in the area (Refs. 37 and 38). State representatives interviewed are not investigating or aware of any other potential sources of the VOCs (Refs. 10 and 52). The former Loudoun County engineer responsible for all landfills during the 1970s and 1980s indicated that the area where the Hidden Lane Landfill is located was very rural in nature prior to the 1990s with no industrial development. He is unaware of any other potential sources of the VOC contamination detected in the Broad Run Farm residential wells (Refs. 10 and 52). The land use surrounding the Hidden Lane Landfill is primarily residential and commercial. No industrial properties have been identified in the area of the VOC contaminated ground water plume. No source, other than the dump has been identified.

Hazardous Substances Released:

TCE
1,1-dichloroethene
1,1,1-trichloroethane
cis-1,2-dichloroethene

The VOCs, TCE, 1,1-dichloroethene, cis-1,2-dichloroethene and 1,1,1-trichloroethane have been detected in residential wells downgradient of the Hidden Lane Landfill. VOCs were also detected in gas samples collected from the dump and soil samples collected from borings installed around the perimeter of the dump.

Ground Water Observed Release Factor Value: 550

3.2.1 Toxicity/Mobility

The toxicity and mobility factor values for the hazardous substances detected in the source samples with containment factor values of greater than 0 are summarized in the table below. The combined toxicity and mobility factor values are assigned in accordance with Reference 1, Section 3.2.1. Hazardous substances detected in the observed release to ground water are assigned a mobility factor value of 1 (Ref. 1, Section 3.2.1.2).

TOXICITY/MOBILITY FACTOR VALUES

Hazardous Substance	Source No.	Toxicity Factor Value	Mobility Factor Value	Observed Release?	Toxicity/ Mobility	Reference
1,1-Dichlorethene	1	100	1	Yes	100	2, p. BI-5
Bis(2-ethylhexyl)phthalate	1	100	0.0001	No	0.01	2, p. BI-2
Pyrene	1	100	0.0001	No	0.01	2, p. BI-10
Chrysene	1	10	1	No	10	2, p. BI-3
Phenanthrene	1	0	0.0001	No	0	2, p. BI-9
Anthracene	1	10	0.0001	No	0.001	2, p. BI-1
cis-1,2-Dichloroethene	1	100	1	Yes	100	2, p. BI-5
Fluoranthene	1	100	0.0001	No	0.01	2, p. BI-2
Benzo(a)pyrene	1	10000	0.0001	No	1	2, p. BI-2
Benzo(a)anthracene	1	1000	0.0001	No	0.1	2, p. BI-2
Benzo(b)fluoranthene	1	NE	NE	No	NE	NE
Indeno(1,2,3-cd)pyrene	1	1000	0.0001	No	0.1	2, p. BI-8
1,1,1-Trichloroethane	1	1	1	Yes	1	2, p. BI-11
Trichloroethene	1	10,000	1	Yes	10,000	2, p. A-2
Di(benzo(a,h)anthracene	1	10000	0.0001	No	1	2, p. BI-4
Benzo(k)fluoranthene	1	100	0.0001	No	0.01	2, p. BI-2
PCB	1	10000	0.0001	No	1	2, p. BI-10

Notes: NE = Not evaluated

Highest Toxicity/Mobility Factor Value: 10,000

3.2.2 Hazardous Waste Quantity

Source No.	Source Type	Source Hazardous Waste Quantity
1	Pile	99,182.77

The ground water pathway hazardous waste quantity factor value (HWQ) is based on the hazardous waste quantity value assigned for source 1 of 99,182.77. The pathway assigned value is therefore 10,000 (Ref. 1, Table 2-6).

Hazardous Waste Quantity Factor Value: 10,000
(Ref. 1, Section 2.4.2.2)

WASTE CHARACTERISTICS FACTOR CATEGORY VALUE

The waste characteristics factor category is obtained by multiplying the toxicity/mobility and hazardous waste quantity factor values, subject to a maximum product of 1×10^8. Based on this product, a value is assigned from Reference 1, Table 2-7.

Toxicity/Mobility Value: 10,000
Hazardous Waste Quantity Value: 10,000

Toxicity/Mobility Factor Value X
Hazardous Waste Quantity Factor Value = $1 \text{ X } 10^8$

Waste Characteristics Factor Category Value: 100
(Reference 1, Table 2-7)

3.3 TARGETS

People within the 4-mile radius target distance category of the Hidden Lane Landfill obtain potable water from both public and domestic wells (Ref. 40). The 4-mile target distance categories are shown in the 4-mile target distance category figure provided in Reference 49. Public water suppliers that serve persons within 4-miles of the dump include the Loudoun County Sanitary Authority (LCSA), Fairfax Water Company (FWC), the City of Fairfax, the Washington Suburban Sanitary Commission (WSSC), and the Potomac Farms Development (Refs. 40, 41, 42, 43, 44, 45 and 46).

LCSA is a blended water system that purchases its water from two sources: the Fairfax Water Company and the City of Fairfax. LCSA does not have any public water supply wells within the 4-mile radius of the Hidden Lane Landfill. LCSA receives approximately 10 million gallons of water per day from FWC and 7 million gallons of water per day from the City of Fairfax. FWC and the City of Fairfax do not have any ground water public supply wells within the 4-mile study area. The WSSC relies on surface water for their supply of potable water and has no ground water wells within the 4-mile study area (Refs. 40, 41, 42, 43 and 44).

The only public water supply wells identified within the 4-mile study area is associated with the Potomac Farms Development (Refs. 40 and 42, p. 2). The water supply provides drinking water to 100 residents in the Potomac Farms Development (Refs. 40 and 42, p. 2). The Potomac Farms Development is located northwest of the Hidden Lane Landfill within the 1 to 2-mile target distance category (Ref. 49).

LCSA assisted Tetra Tech in identifying developments that are not connected to the public water supply. LCSA informed Tetra Tech that all new communities in the Sterling area were connected to public water, but some of the older developments had not been connected to public water and still rely on private drinking water wells. The Broad Run Farms subdivision is located directly west of the dump. People residing in this community rely on private domestic wells for their potable supply. There are three additional areas located within the 4-mile study area identified by LCSA as not being connected to public water. The first area is located along Oak Lane, Jefferson Drive, and Potomac View Road, in Sterling, Virginia. This area is located within the 2 to 3-mile distance category. The second area is also located in Sterling, Virginia and is located within the 3 to 4-mile distance category and includes Cedar Drive, Lakeland Drive, Thomas Avenue, and Lake Drive. Finally, LCSA estimated that approximately 12 residents located along Hay Road and Ashburn Road within the town of Ashburn may not be connected to

public water; therefore, the population served by these wells has also been counted as potential targets (Refs. 40 and 50).

The populations relying on private domestic wells are summarized in the table shown below. The population calculations are based on the number of persons living in the house served by the well, or if that is unknown, the average persons per household of 2.82 for Loudoun County, Virginia (Refs. 47, 49, 50 and 55).

PRIVATE DRINKING WATER WELLS
BALLS BLUFF SILTSONE

Radius	Number of Wells	Population Served
0 - 0.25	91	89 x 2.82 = 250.98 + 9 (Pop. served by 003-PW-03 and 020-PW-020) = 259.98
0.25 - 0.5	138	136 x 2.82 = 383.52 + 8 (Pop. served by 007-PW-07 and 039-PW-39) = 391.52
0.5 - 1.0	60	58 x 2.82 = 163.56 + 9 (Pop. served by 034-PW-34 and 036-PW-36) = 172.56
1.0 - 2.0	23	23 x 2.82 = 64.86
2.0 - 3.0	36	36 x 2.82 = 101.52
3.0 - 4.0	121	121 x 2.82 = 341.22

Notes:
Pop. = Population
Refs. 47, 49, 50 and 55

LEVEL I DRINKING WATER TARGETS
BALLS BLUFF SILTSTONE

Well ID	Distance Category (Miles)	Level I	Level II	Reference
003-PW-03	0 to 0.25	Yes	NA	50; Section 3.1.1
012-PW-12	0 to 0.25	Yes	NA	50; Section 3.1.1
018-PW-18	0 to 0.25	Yes	NA	50; Section 3.1.1
020-PW-20	0 to 0.25	Yes	NA	50; Section 3.1.1
040-PW-40	0 to 0.25	Yes	NA	50; Section 3.1.1
007-PW-07	0.25 to 0.50	Yes	NA	50; Section 3.1.1
026-PW-26	0.25 to 0.50	Yes	NA	50; Section 3.1.1
039-PW-39	0.25 to 0.50	Yes	NA	50; Section 3.1.1
011-PW-11	0.50 to 1.0	Yes	NA	50; Section 3.1.1
021-PW-21	0.50 to 1.0	Yes	NA	50; Section 3.1.1
032-PW-32	0.50 to 1.0	Yes	NA	50; Section 3.1.1
034-PW-34	0.50 to 1.0	Yes	NA	50; Section 3.1.1
036-PW-36	0.50 to 1.0	Yes	NA	50; Section 3.1.1

3.3.1 NEAREST WELL

Well ID: 012-PW-12A

Level of Contamination (I, II, or potential): Level I (130 ppb TCE)

Distance from source in miles: 300 feet

Nearest Well Factor Value: 50

(Ref. 1, Section 3.3.1, Table 3-11; 50; 55)

3.3.2 POPULATION

3.3.2.1 Level of Contamination

3.3.2.2 Level I Concentrations

As documented in section 3.1.1, the observed release to ground water section of this documentation record, Level I concentrations are present in drinking water wells. The drinking water wells with Level I concentrations and the population served by each well are presented in the table below. All of the Level I wells are domestic wells located in the Broad Run Farms development. The population served by each well is the average number of person per household for Loudoun County, Virginia, which is 2.82 (Ref. 1, Section 3.3.2.1 and Table 3-10; 47).

LEVEL I DRINKING WATER WELLS

Level I Well	Population *	References
011-PW-11	2.82	47 and 55
012-PW-12	2.82	47 and 55
018-PW-18	2.82	47 and 55
021-PW-21	2.82	47 and 55
026-PW-26	2.82	47 and 55
032-PW-32	2.82	47 and 55
034-PW-34	3	47 and 55
036-PW-36	6	47 and 55
040-PW-40	2.82	47 and 55
003-PW-03	5	55
020-PW-20	4	55
007-PW-07	4	55
039-PW-39	4	55

Notes: * The population is based on the number of persons residing at the location, if this number was not available; the average number of persons per household for Loudoun County, VA was used (Refs. 47 and 55).

Sum of Population Served by Level I Wells: 45.74
Sum of Population Served by Level I Wells × 10: 457.4

Level I Concentrations Factor Value: 457.4

3.3.2.3 Level II Concentrations

No Level II concentrations were established.

Level II Concentrations Factor Value: 0

3.3.2.4 Potential Contamination

The population subject to potential contamination is that population served by drinking water supply wells, which are not subject to Level I or Level II concentrations. The distance-weighted values for that population are listed below, as specified in Reference 1, Section 3.3.2.4, Table 3-12 (Refs. 48, 49 and 50).

POTENTIAL TARGETS

BALLS BLUFF SILTSTONE

Distance Category (miles)	Population Served	Reference	Distance-Weighted Population Value
0.00 to 0.25	242.52	Refs. 47, 49, 50 and 55	164
0.25 to 0.50	380.70	Refs. 47, 49, 50 and 55	324
0.50 to 1.0	155.1	Refs. 47, 49, 50 and 55	52
1.0 to 2.0	64.86	Refs. 47, 49, 50 and 55	10
2.0 to 3.0	101.52	Refs. 47, 49, 50 and 55	21
3.0 to 4.0	341.22	Refs. 47, 49, 50 and 55	42

Sum of Distance-Weighted Population Values: 613
Sum of Distance-Weighted Population Values/10: 61.3

Potential Contamination Factor Value: 61.3

3.3.3 RESOURCES

No resource wells have been identified.

Resources: 0

3.3.4 WELLHEAD PROTECTION AREA

The Balls Bluff Siltstone is not a wellhead protected aquifer; therefore, a value of zero is assigned.

Wellhead Protection Area Factor Value: 0